

Fragmentation of ^{64}Ni Data Processing

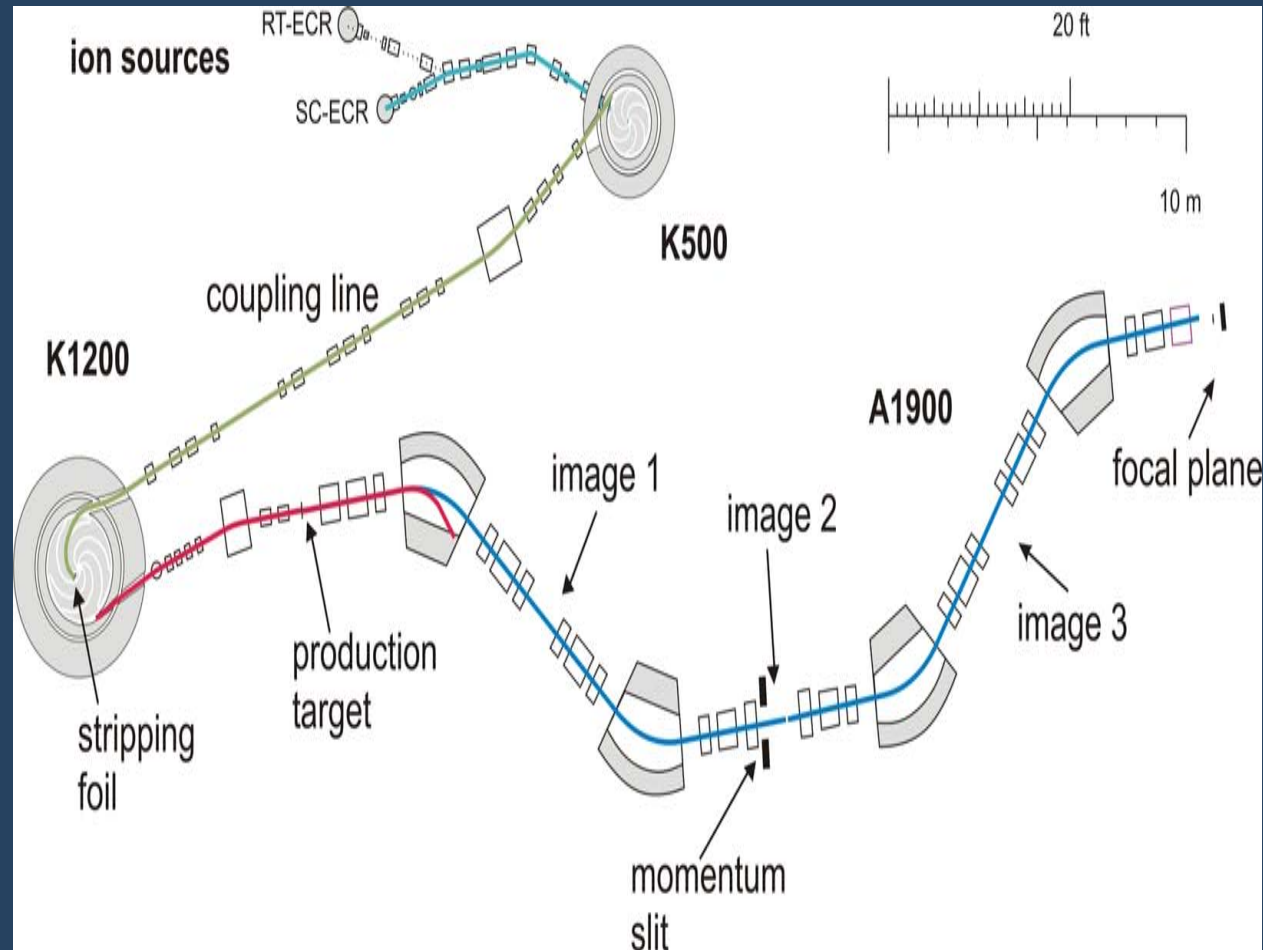
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REU presentation, East Lansing, August 2005

Introduction and Interest

- The Experiment on fragmentation of ^{64}Ni was conducted in March 2005
- This experiment is part of the series of experiments that examine effect of different N/Z compositions of beam and targets in the fragmentation of ^{40}Ca , ^{48}Ca , and ^{58}Ni on ^9Be and ^{181}Ta targets.
- Experiment Goals
 - Compile a comprehensive set of fragment cross-sections from projectile fragmentation.
 - Understand how rare isotopes are produced.
 - Important for future experiments and facilities (RIA)

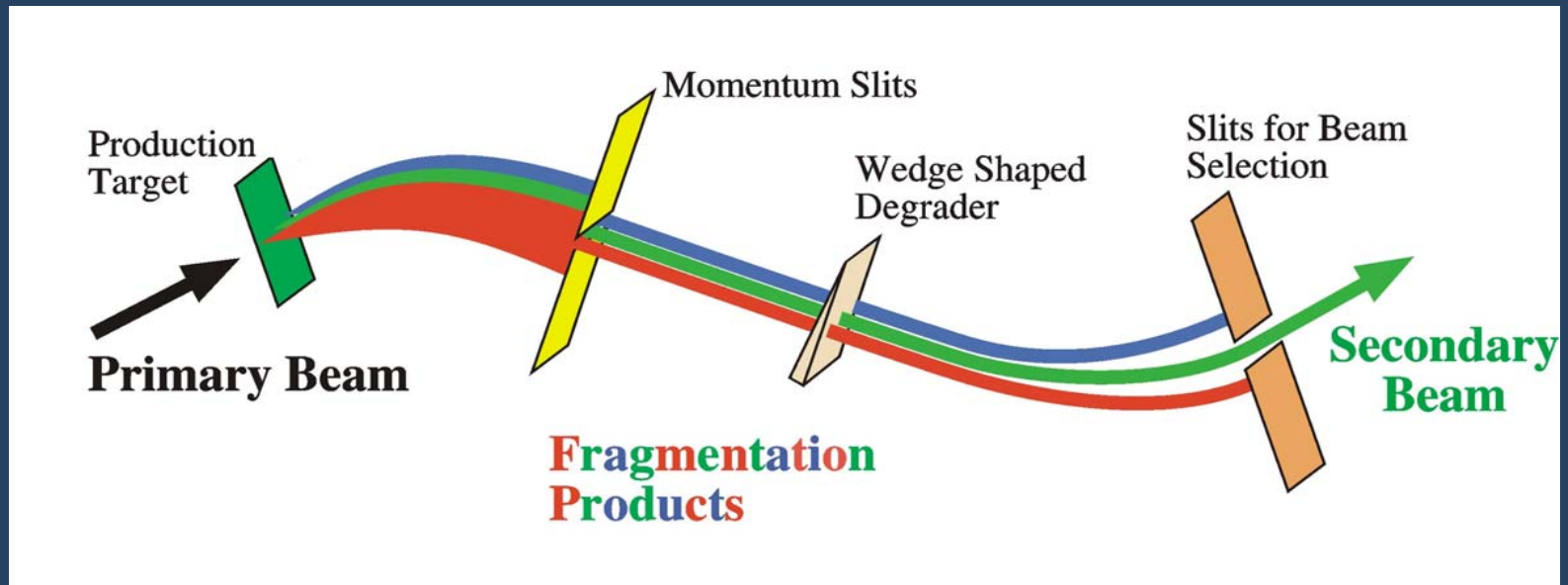
The Experiment

- **Projectile fragmentation method**
- **^{64}Ni isotopes** (beam) at 140 MeV/u produced in the coupled K500 and K1200 cyclotrons.
- The beam strikes the production target.
- Fragments produced in the fragmentation of ^{64}Ni are identified using A1900 separator



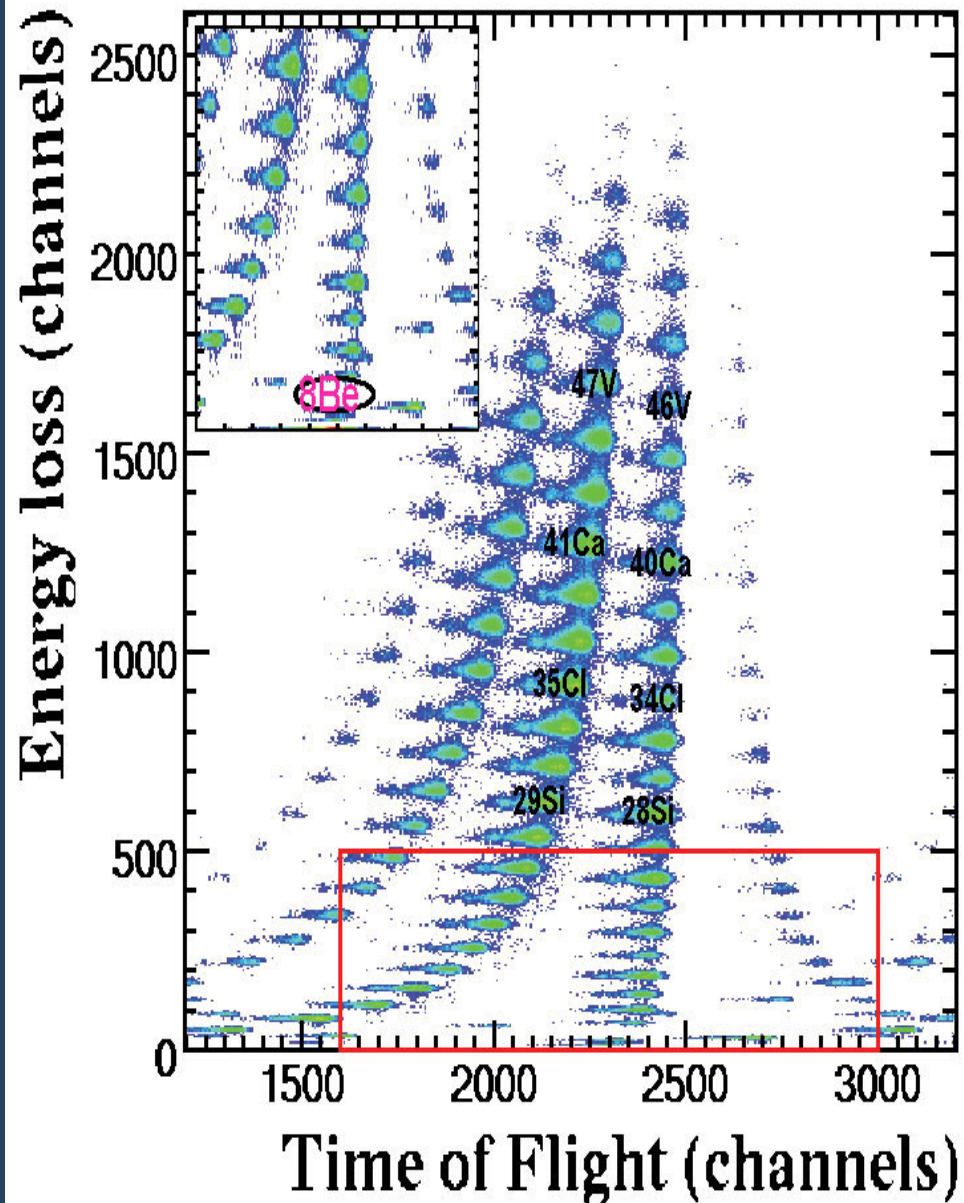
The A1900: Fragment Separator

- Using magnetic rigidity $B\rho$ to identify isotopes
- $B\rho = p/Q = Av/Q \rightarrow A/Z$

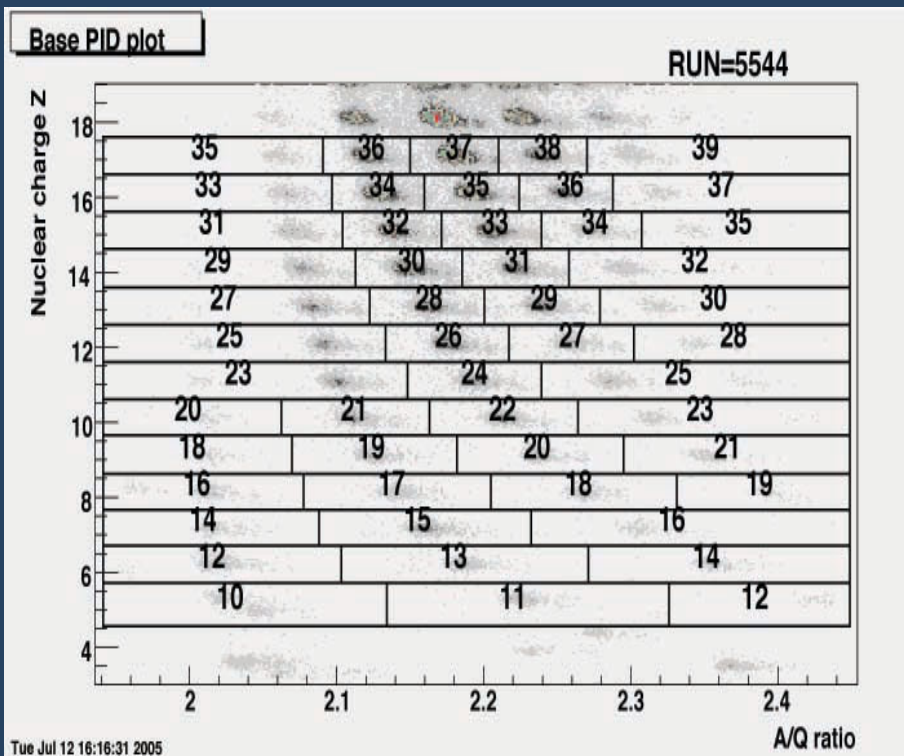


Data

- PID (particle identification) done using DE , $B\rho$, and TOF
- Uses $N=Z$ line
- Search for ${}^8\text{Be}$
- 200 fragments produced
 - Low as C and high as Ni



Data (cont.)



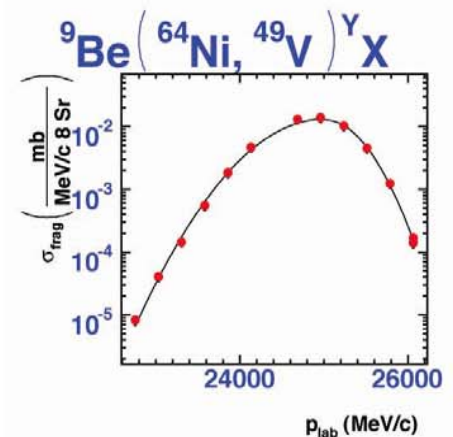
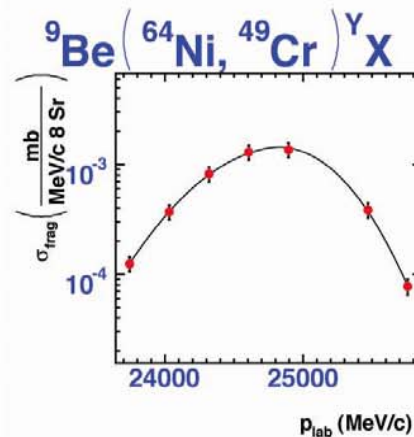
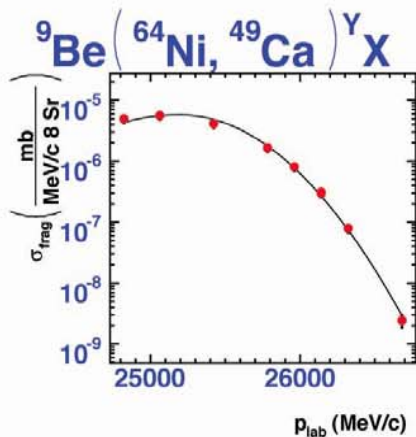
- Data processed using ROOT and scripts
- The scripts performed several functions
 - Made cuts for Z, Q, and A/Q
 - Allowed for isotope identification
- Process used for each run

Momentum Distributions

- Cross Section: Probability of reaction

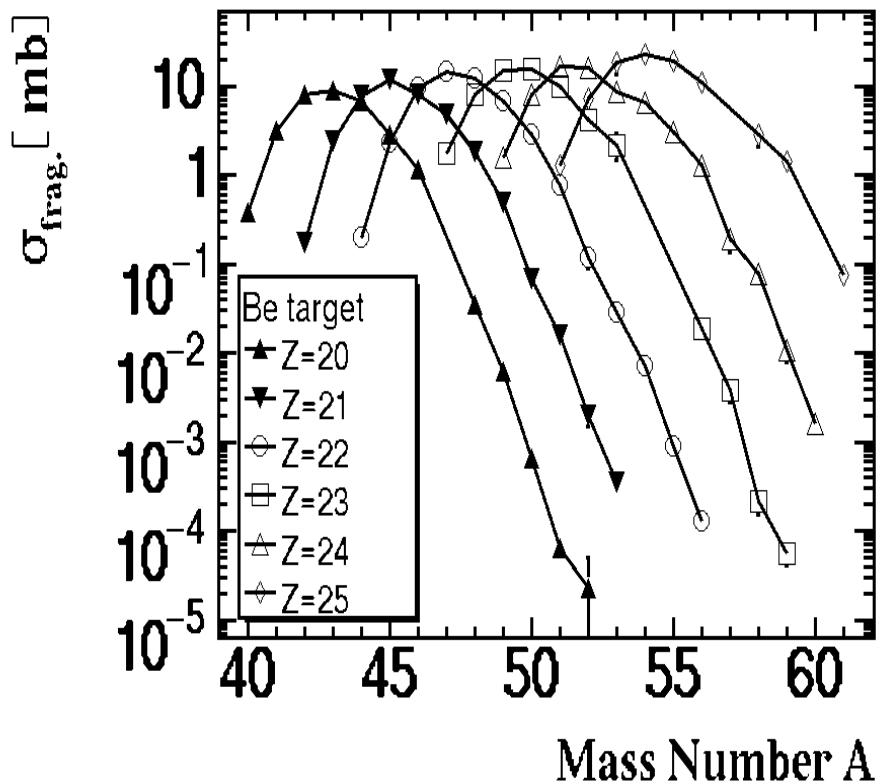
- $$\frac{d}{dp} \frac{Y_{\text{transmission}}}{N_{\text{beam}} n_{\text{target}} \text{life}} \quad [\text{mb}/(\text{MeV}/c)]$$

- Momentum p obtained from $B\rho$ equation



Isotopic distributions: $Z=20-25$

64Ni fragments



- Integration of momentum distributions will give cross sections for specific isotopes

- More isotopic distributions to be generated

Summary & Conclusions

- Extraction of isotopes for approximately 200 fragmentation cross sections of $^{64}\text{Ni}+^9\text{Be}$ has been completed
- Still much more analysis to be done
 - Integration of cross sections to obtain isotope distributions for other fragments
 - Comparison to theoretical models
 - $^{64}\text{Ni}+^{181}\text{Ta}$ analysis to be completed in similar fashion

Thank You

- Michal Mocko
- Betty Tsang
- NSF